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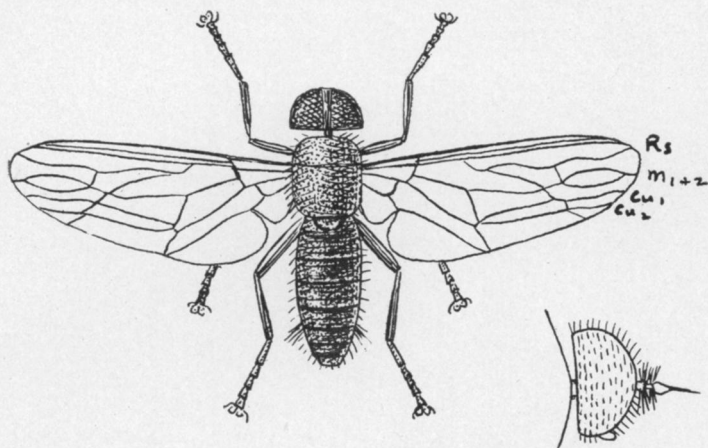


FIG. 2.—*Hirmoncra breviostris*, after Macquart.

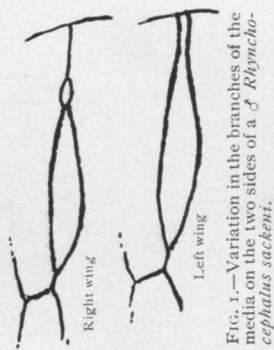


FIG. 1.—Variation in the branches of the media on the two sides of a ♂ *Rhynchocephalus sackeni*.



FIG. 3.—*Rhynchocephalus sackeni*, from Williston's figure.



FIG. 4.—*Hirmoncra melanderi*, photograph of the type.

THE DIPTEROUS FAMILY NEMESTRINIDÆ.

BY T. D. A. COCKERELL.

(Plate XVI).

My attention was first called to the Nemestrinidæ by the discovery of a beautifully preserved specimen (*Hirmoneura melanderi*, fig. 4) in the miocene shales of Florissant, Colorado. A second fossil species of the same genus was found among some Florissant material collected long ago, and now in the Museum of Yale University. Professor A. L. Melander, with great generosity, loaned me all his material of this family, representing three species of *Nemestrina* from Turkestan, two of *Rhynchocephalus*, and a beautiful *Hirmoneura* from Texas. The last was recognized by him as new, and it is with his kind permission that I describe it. Professor A. P. Morse very kindly sent me particulars about Scudder's type of *Palembolus*; and to Dr. L. O. Howard and his associates I am indebted for copies of several descriptions, the loan of specimens of *Rhynchocephalus* and the excellent reproductions of the figures of *R. sackeni* and *Hirmoneura brevirostris* (figs. 2 and 3). The photograph of the type of *H. melanderi* was made at the American Museum of Natural History, and is here published with the kind permission of Dr. Bumpus.

The Nemestrinidæ constitute a very ancient family of brachycerous Diptera, a species (*Prohirmoneura jurassica* Handlirsch) having been discovered in the jurassic rocks of Bavaria. Today, they are much reduced in numbers, and in North America are so rare that there are many Dipterologists who have never taken a specimen. They were probably more numerous in miocene times, since three have been described from Florissant—a number altogether exceeding what might be expected in any similar deposit made in America at the present time.

In their venation they are singularly variable (see fig. 1, showing variation in *R. sackeni*), characters which would be of generic value in some other families, proving inconstant here within specific limits. Dr. Williston, in a recent conversation, remarked to me that in his experience it seemed that waning types often showed such variability; whether the morphological break-up is the result or the cause of the failure to persist is an open question.

The venation has been considered very aberrant, but in a former paper (Am. Jn. Sci., April, 1908) I have regarded it as primitive, and have seen in the nervures which bound the second posterior cell the true branches of the cubitus. This view differs from that of Comstock and Needham, and, if sustained, requires a partial modification of their nomenclature. In the accompanying figures I have indicated the veins as I understand them. The following synopsis includes all the known North American species, recent and fossil.

SYNOPSIS OF NORTH AMERICAN NEMESTRINIDÆ.

A.—Proboscis long, projecting anteriorly; subf. *Nemestrinæ* (Miocene in N. America; living in Asia).

PALEMBOLUS Scudder.

Palembolus Scudder, Bull. U. S. Geol. and Geog. Surv. Terr., iv (1878), p. 526.

Palembolus Scudder, in Zittel. Handb., i (ii), p. 808 (1885), fig. 1076; Eastman's Edition, i, p. 688, fig. 1467.

Palombolus [err. typ.] Handlirsch, Foss. Insekten, vii (1907), p. 1009.

Related to *Nemestrina* (species from Turkestan compared), but without any cross nervure from the radial sector to the base of the fork of the media.

Palembolus florigerus Scudder, l. c.

Miocene shales, Florissant, Colorado. Type in Museum of Comparative Zoology, Harvard University.

I am greatly indebted to Mr. A. P. Morse for examining, at my request, Scudder's type of *Palembolus*. He compared it carefully with the figure given in Zittel's work, and found it in the main as there represented, but differing in slight details. "The wings are narrower proportionately than represented. The *distal* half of wing on *right* side of figure is more nearly correct, and the *basal* half of wing on *left* side." *There was no evidence whatever of any third radio-medial cross-nervure*; in lacking this nervure the genus agrees with the Jurassic *Prohirmoneura* on the one hand, and the living *Trichophthalma albibasis* (as figured by Handlirsch) on the other. There was some indication of "seam-veins" in the right wing (but not in the left), especially one forming a broadly triangular pseudo-cell, with its apex at the point of branching of the media. Mr. Henshaw also examined this structure, and agreed with Mr. Morse that it was not a genuine vein; indeed, from its position, it could hardly be one. Whether we have here some indication of the retic-

ulation of the apical field found in *Megistorhynchus* I do not know. In general, the venation of *Palembolus* differs very little from that of *Trichophthalma*; so far as the structure of the wing goes, they might very well belong to the same genus.

B.—Proboscis long, directed downwards or backwards; subf. *Rhynchocephalinae* (Living in N. America, etc.).

RHYNCHOCEPHALUS Fischer, 1806.

(1) *Rhynchocephalus* s. str.

Branches of cubitus meeting before margin of wing = second posterior cell closed (Williston).

Rhynchocephalus sackeni Williston, Tr. Conn. Acad. Sci., iv, p. 243.

As Williston's description is rather inaccessible, it is given herewith:

"Black, with light yellowish hair. Head broader than thorax, brownish-black. Front broad, thinly blackish haired on the vertex; the lower part, the face, cheeks, and posterior orbits, with thick, bushy, yellowish-white hair, becoming nearly white below. Antennæ short, reddish-yellow, base of first joint infuscated, two first joints subquadrate, third circular. Style of three joints, first joint short, yellowish, second joint twice as long, basal half infuscated, third as long as two first, fuscous. Proboscis reaching the hind coxæ, labium black, other parts, with the slender minute palpi, luteous. Dorsum of thorax and scutellum brownish-black, with yellowish hair; pleuræ and pectus with longer, bushy, grayish-white hair. Abdomen short and broad, black; second segment above, and all the segments upon their sides, with yellowish hair, somewhat intermixed with black at the incisures; third and remaining segments above with sparse hairs and thick yellowish tomentum, wanting upon their anterior borders, giving the abdomen a slightly fasciated appearance. Venter with whitish pile. Lamellæ of the ovipositor slender, black, luteous at extreme base, about as long as intermediate femora. Feet luteous. Femora white tomentose, with tufts of hair on their undersides near the coxæ; anterior and middle pairs, for their basal two-thirds, and posterior, except extreme tips, black. Anterior and middle tarsi infuscated, posterior more so, blackish. Wings hyaline; neuration as in the figure.

"Adventitious oblique vein but slightly arcuated, terminating beyond the middle of the apical half, not continued to posterior border, so that the third and fifth posterior cells are not completely separated; both cross-veins obsolete. Three submarginal cells; first and second open, slender. First posterior open, second closed, the brief petiole terminating in the end of the costal vein before the tip of the wing, fourth (third of Osten Sacken) closed, as usual; third a little shorter than fifth. Long. corp. 9 mm.; long. al. 9 mm. Olympia, Washington Territory,—H. K. Morrison."

Dr. Williston adds that it closely resembles *R. tauscheri*, differing chiefly in the length of the proboscis and the color of the head.

In Entomological News, v, p. 47, it is recorded that Professor L. Bruner found *R. sackeni* near Colorado Springs, Colorado, and observed it apparently depositing eggs in a stem of *Eriogonum alatum*. I have examined two specimens in the collection of the Colorado Agricultural College, collected at Fort Collins, Colorado, June 12th; also one from Clark County, Kansas, June, collected by Dr. Snow.

***Rhynchocephalus subnitens* n. sp.**

♀.—Smaller than *R. sackeni* Will.; length of wing just over 8 mm. (over 9½ in *sackeni*); pubescence paler, with a sort of greenish-grey tint; abdomen less hairy, the bases of segments 2-4 broadly exposed, shining black; ovipositor shorter, with a stronger, more even curvature; eyes apparently lighter and redder; ultimate branches of cubitus (bounding second posterior cell of Williston) uniting only a very short distance before margin of wing (a considerable distance in *sackeni*).

Hab.—Clark Co., Kansas, June, alt. 1960 feet (*Snow*). In the collection of Prof. A. L. Melander. A female of *R. sackeni* Will. also comes from Clark Co., bearing exactly the same data as the type of *R. subnitens*. Two males of *R. sackeni*, agreeing in appearance with the Clark Co. female, are also before me, loaned by the U. S. National Museum. They are labelled Colorado, 8-9000, the latter doubtless referring to the altitude in feet. The collector is not indicated.

In certain respects, the venation of *Rhynchocephalus* is quite variable. Thus:

Third submarginal cell (Williston), i. e. cell bounded by M_1 and M_2 .

(a) Open at apex, often quite broadly. *R. subnitens*; *R. sackeni*.

(b) Closed far below margin of wing, with a small cell at its apex, and the single nervure beyond about as long as that at end of second posterior cell. Right side of one ♂ *R. sackeni*.

(c) Sessile at base (i. e. as Williston figures for *R. volaticus*).

R. subnitens; *R. sackeni*.

(d) Sessile and narrowly truncate at base. *R. sackeni*, one ♂.

(e) Short-stalked at base. *R. sackeni*, one ♂.

Second posterior cell (Williston), i. e. cell bounded by Cu_1 and Cu_2 , according to my interpretation. Sometimes the lower side is a little lower than that of the cell basad of it (fourth posterior), but usually these practically coincide. The difference in the position of the apex of the cell appears to be a specific character, so far as the material shows.

(2) Group (subg. ?) of *R. volaticus*.

Branches of cubitus not meeting = second posterior cell open (Williston).

Rhynchocephalus volaticus Williston, Can. Ent., xv, p. 71.

Florida. ♀.—Length 12 mm., wings 11 mm.; black, with light yellowish pile; abdomen distinctly fasciate; third joint of antennæ

obtusely oval; third joint of style three times as long as the first two together; proboscis reaching about to hind coxæ; lamellæ of ovipositor slender, black, about as long as middle femora.

C.—Proboscis short; subf. *Hirmoneurinae* (Miocene and Living).

HIRMONEURA Meigen, 1820 (Type *H. obscura* (W.) Meig.).

The following table separates the North American species:

Terminal branches of both media and cubitus uniting before reaching the margin of the wing, forming closed cells (subg. *Parasymmictus* Bigot).

H. clausa O. S.

Branches of media meeting, enclosing a cell, but those of cubitus parallel, not even approaching; eyes pubescent.....

Branches of media and cubitus not meeting apically.....1.

1. Miocene species.....2.

Living species.....3.

2. Stem of cubitus nearly in a straight line with its lower branch.

H. vulcanica Ckll.

Stem of cubitus not nearly in a straight line with either branch.

H. melanderi Ckll.

3. Eyes hairy, with quite long black pile.....**H. texana** Ckll.
Eyes bare, or at most with very few minute hairs.....4.

4. Brown, with pale rufous legs; palpi rufous.....**H. psilotes** O. S.

Black, with yellowish legs; palpi yellow.....**H. flavipes** Williston.

The genus appears to contain discordant elements, which might form the basis of two or three genera or subgenera, but upon closer analysis such divisions seem of doubtful value. The venational character of the closed cells in the branches of the media and cubitus is important, but not so stable in this family as in others. In a specimen of *Rhynchocephalus sackeni* the branches of the media fuse on one side, and remain open on the other.

The hairiness of the eyes seems equally important; but it is not an absolute character, as Williston notes that the female *H. flavipes* shows a few scattering hairs, visible with a lens, and suggests that the male may prove to have the eyes distinctly pubescent. It is noteworthy that *H. brevisrostris* and *H. texana*, known only in the male, have hairy eyes; while *H. clausa*, *H. psilotes* and *H. flavipes*, known only in the female, have them bare. *H. obscura*, the type of the genus, has them bare.

Hirmoneura clausa Osten Sacken, Western Diptera (1877), p. 225.

Dallas, Texas (*Boll*). Figured in Comstock's Manual, p. 460, as *Rhynchocephalus*.

Hirmonaura brevirostris Macquart, Dipt. Exot., Suppl. 1, 101.

The description is as follows; the species has not been found in recent years.

"*Fusca albo-tomentoso. Proboscide brevis. Pedibus rufis. Alis hyalinis.* (Tab. 20, fig. 1.)

"Long. 4½. 1. ♂. Corps assez étroit. Trompe très courte, à peine saillante. Face noire, à duvet gris. Front linéaire. Antennes brunes; les deux premiers articles très velus; troisième brièvement conique. Yeux velus. Thorax et abdomen d'un brun mat, à poils blancs: ce dernier de six segments distincts. Pieds d'un fauve clair, à duvet et poils blancs. Ailes: trois cellules sous-marginales, dont les première et troisième sont fermées; cinq postérieures, dont la quatrième est fermée.

De Mérida de Yucatan. Trouvé par M. Pilate."

Hirmonaura flavipes Williston, Trans. Amer. Ent. Soc., xiii, p. 292.

♂. "Black, thickly pollinose; antennæ and legs yellowish; wings nearly hyaline, narrowly luteous in front;...length, with ovipositor 15 mm., without, 13 mm....front narrow, only a little wider below, a little shining, with greyish pollen and black pile....antennæ situated below the middle of the head in profile, short, joints of nearly equal length, the third cordate; pile of basal joints yellow and blackish....face with sparse yellowish pile, but that of the palpi longer, blackish....thorax black, but mostly concealed beneath uniform, thick greyish brownish dust; pile erect, moderately abundant, not long, lutescent yellowish....abdomen like the dorsum of the thorax; at the base, with yellowish pile, beyond with short, reclining, sparse black hairs; a narrow band at the base of second segment, gray pollinose, beyond it a broader brown band; ovipositor directed backwards, composed of five segments, their entire length about equal to that of the two preceding segments together, forming a tapering continuation of the abdomen, the last one elongate, reddish, and split nearly to its base; legs light yellow, the tips of the four anterior tarsi, the tip of hind femora and the rest of hind legs reddish." (Williston.)

A species of the United States, but no particular locality is given.

Hirmonaura psilotes Osten Sacken, Biol. Cent.-Amer., Dipt., i, p. 74.

As the description is not available in many places, it is copied in full.

"♂. Brown, with a brownish-yellow pollen; legs pale rufous; antennæ and palpi rufous; wings tinged with pale brownish, brownish-yellow along the costa; eyes glabrous.

Length, without the ovipositor, about 13 millim.

Hab.—Mexico (Sumichrast).

Proboscis rufous, short, the large lips but little projecting outside of the oral opening; last joint of the palpi long, cylindrical, pale, rufous, closely applied to the facial orbit of the eye and almost reaching the antennæ; antennæ rufous, beset with rufous hair; face and front densely covered with a yellowish-gray pollen; the face beset with pale rufous hairs, the front with black hairs mixed with rufous ones, the latter especially visible in front of the ocelli; front nearly parallel, the vertex very little narrower; eyes glabrous. The brown ground-

color of the thoracic dorsum is modified by a brownish-yellow pollen and yellowish hairs, which cover its surface; the hairs longer on its sides; pleuræ and sternum more grey, with paler yellow hairs; post-alter callosities reddish; scutellum brown. The abdomen, like the thorax, derives its colouring from a brownish pollen which is darker on the posterior half of segments 2, 3, 4 (these segments thus showing slight traces of darker cross-bands); the base with longer pale yellowish-rufous hairs; the posterior half of segment 2, as well as the two following segments, beset with short, semierect black hairs; the three following segments (5-7) are shorter and narrower and end in an ovipositor, which, so far as I can see, consists of a short tube, longitudinally split in two. Legs pale rufous; hind femora slightly brownish at the tip; hind tarsi brown. Wings with a pale brownish tinge, more yellowish along the costa; veins on the antero-proximal half rufous, on the remainder of the wing dark brown; venation like that of the European *H. obscura*, only the handle of the fork of the third vein is straighter. A single female in Prof. Bellardi's collection."

Hirmoneura texana n. sp.

Hirmoneura B. Cockerell, Amer. Jn. Sci., April, 1908, p. 311. (Description and figures of venation).

♂.—Length about 11½ mm., wings 11; black, marked with red on the abdomen; the abundant hair partly black and partly white; eyes purplish-red, almost entirely covering the head, and covered with quite long black pile; lateral ocelli touching eyes; face and base of antennæ with long black hair, mouth and cheeks with white hair; exposed parts of front, face and occiput black; third antennal joint broad, approximately heart-shaped; style black; thorax rather dull dark brown—between coffee and slate color, densely white-haired on sides and beneath, above with the hair mostly black, but largely white on the disc; wings hyaline, faintly dusky, splendidly iridescent; all the apical cells open; legs ferruginous, blackened apically; pile of femora white, except a little black at end, of tibiae and tarsi short and black; abdomen brown-black, with the hind margins of the segments ferruginous, very broadly so at the sides; approximately basal half of segments with white hair, and apical with black; at the sides this hair forms conspicuous dense tufts, alternating black and white.

Hab.—New Braunfels, Texas, May 12, 1902, taken by Prof. A. L. Melander on a barbed-wire fence.

Hirmoneura melanderi Ckll., Am. Jn. Sci., April, 1903, p. 311.

Miocene shales of Florissant. Length about 15½ mm., wings 10.

A second specimen (Florissant, Sta. 14, *W. P. Cockerell*) shows the abdomen and wings, but lacks the head and nearly all of the thorax. It agrees with the type, except that the abdomen is very long and tapering, the distance from the base of the wings to the top of the abdomen being about 15 mm. In its general shape, the abdomen is suggestive of some species of *Nemestrina*. The specimen is probably a female.

Hirmoneura vulcanica Ckll., Am. Jn. Sci., April, 1903, p. 311.

Miocene shales of Florissant. Length about 12 mm., wings 11.